MULTIMEDIA UNIVERSITY

STUDENT ID NO

MULTIMEDIA UNIVERSITY

FINAL EXAMINATION

TRIMESTER 1, 2017/2018

TES3141 – EXPERT SYSTEMS

(All Sections / Groups)

25 OCTOBER 2017
2.30 p.m. – 4.30 p.m.
(2 Hours)

INSTRUCTIONS TO STUDENTS

1. This question paper consists of 6 pages with 4 questions only.
2. Attempt **ALL** questions. All questions carry equal marks and the distribution of the marks for each question is given.
3. Please write all your answers in the Answer Booklet provided.

QUESTION 1

(a) Your university is considering to develop an expert system for recommending a postgraduate study program from existing and targeted sets of skills. Describe THREE advantages of deploying an expert system to convince the management team.

[3 marks]

(b) Knowledge can be classified into procedural knowledge, declarative knowledge, and tacit knowledge. How do you distinguish procedural knowledge, declarative knowledge and tacit knowledge? Give an example of each knowledge type.

[3 marks]

(c) Suppose Gary successfully made some plain pancakes previously and today he wants to prepare blueberry pancakes. Using case-based reasoning method, explain the four processes that Gary should follow in making the blueberry pancakes.

[4 marks]

Continued...

QUESTION 2

(a) Use the following to write quantified first-order predicate logic formulas:

P(x) = x is a programmer
S(x) = x is smart

i. Every programmer is smart.
ii. Everyone smart is a programmer.
iii. Some programmers are not smart.
iv. There are programmers.
v. Not everyone smart is a programmer.
vi. Not all programmers are smart.
vii. Someone is smart.
viii. Someone smart is a programmer.
ix. Someone not smart is a programmer.
x. Someone smart is not a programmer.

[5 marks]

(b) Given the two sentences below:

> If I pass this subject then I get an A
> and
> I pass this subject and I do not get an A.

i. Write the sentences using logical symbols. [1 mark]
ii. Write the truth table of the sentences. [1 mark]
iii. Determine whether they are tautology, contradiction, or contingent statements. [0.5 mark]

(c) Draw a frame system for the car class. Consider their characteristics like manufacturer, model, transmission type, seat capacity, and owner. Include one instance of car class with filled slots. [2.5 marks]

Continued...

QUESTION 3

(a)

(i) Study the following information carefully.

```
IF        you have good working attitude
AND       you are lucky
THEN      you will be promoted soon      CF = 0.5


Assuming that

CF (you have good working attitude) = 0.7
CF (you are lucky)                  = 0.6
```

Calculate CF(you will be promoted soon). [1 mark]

(ii) Study the following information carefully.

```
IF        you have good results
OR        you have good communication skills
THEN      you will get a good job       CF = 0.9

Assuming that

CF (you have good results)               = 0.8
CF (you have good communication skills) = 0.7
```

Calculate CF(you will get a good job). [1 mark]

Continued...

(b) Given the following information:

IF Microsoft says Windows Phone will be popular
THEN you can buy Windows Phone
$CF_{rule1}=0.6$

IF Nokia says Windows Phone will be popular
THEN you can buy Windows Phone
$CF_{rule2}=0.7$

Assuming that

CF (Microsoft says Windows Phone will be popular) = 0.9
CF (Nokia says Windows Phone will be popular) = 0.5

Calculate $CF_{combined}(CF_{rule1}, CF_{rule2})$. Justify your answer based on the certainty factors. [5 marks]

(c) Draw a semantic network for the following statements.

Tom is an elephant.
Elephant is a kind of mammal.
Mammal has hair.
Elephant has grey skin.
Elephant has trunk.
Tom is owned by Jerry.

[3 marks]

Continued...

QUESTION 4

Given the rules:

```
Rule 1: IF hardworking THEN pass subject.
Rule 2: IF hardworking THEN fail subject.
```

and assuming that:

```
p = pass subject
f = fail subject
Θ = {p, f}
m1(p)= 0.8      m1(Θ)= 0.2 for Rule 1
m2(f)= 0.3      m2(Θ)= 0.7 for Rule 2
```

i) Produce the Dempster-Shafer table showing the combination of evidence. [2 marks]

ii) Calculate the combined mass (before normalization). [1.5 marks]

iii) Calculate κ. [2 marks]

iv) Calculate the combined mass (after normalization). [1.5 marks]

v) Calculate the combined belief function. [1 mark]

vi) Calculate the plausibilities. [1 mark]

vii) Calculate the evidential intervals. [1 mark]

End of Paper